

71-9234

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*Containers & Cylinders for Chemicals & Gases  
UF<sub>6</sub> & UO<sub>2</sub> Packaging • Galvanizing & Tinning Kettles*

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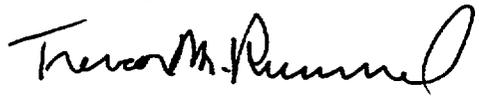
Mr. David H. Tiktinsky, Project Manager  
Licensing Section, Spent Fuel Project Office  
Office of Nuclear Material Safety and Safeguards  
United States Nuclear Regulatory Commission  
11545 Rockville Pike, Mail Stop 13-D-13  
Rockville, MD 20852

Re: NCI 21-PF-1 (USA/9234/BF-85) RAI of October 19, 2000

Dear Mr. Tiktinsky,

Please find attached ten copies of Sections 7 and 8 of the NCI 21-PF-1 (USA/9234/BF-85) SAR, Revision 6. These sections have been revised to address your request for additional information (dated 10/19/2000). Additional changes have been made to the text for consistency between Section 7 and Section 8. Also, the paragraphs concerning the loading temperature and pressure of the cylinder (7.1.4.5) and removal of the cylinder security seal and valve protection device (7.2.1.6 and 7.2.1.7) have been modified to accommodate users that do not fill cylinders. Finally, Section 7.1.5 has been renumbered for consistency. Please do not hesitate to call if you have any questions regarding these changes.

Sincerely,



Trevor M. Rummel  
Senior Vice President

Attachments: SAR changed pages - Section 7 & Section 8

NmSSDI Public

**SECTION SEVEN    OPERATING PROCEDURES**

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## **7. OPERATING PROCEDURES**

The NCI 21-PF-1 overpack is loaded and unloaded and the 30B UF<sub>6</sub> cylinder is filled, tested, and handled in accordance with standard, in-plant operating procedures at various enrichment plants and at various nuclear fuel facilities. The basic procedural requirements are described in USEC-651 and ANSI Standard N14.1. As a minimum, the specific procedures include the steps described in the subsequent sections.

### **7.1 Procedures for Loading Package**

#### **7.1.1 Receipt and Filling of 30B Cylinder**

Receipt and filling of the 30B cylinder shall be performed in accordance with in-plant operating procedures and ANSI N14.1.

#### **7.1.2 Cylinder Inspection**

Complete an inspection of the 30B cylinder as described in USEC-651, or equivalent in-plant operating procedures, and ANSI N14.1 prior to insertion into NCI 21-PF-1 Overpack. Any defective conditions must be corrected, and the cylinder must be re-certified prior to use.

#### **7.1.3 Overpack and Valve Protection Device Inspection**

The user shall establish and implement written procedures to inspect the NCI 21-PF-1 Overpack and Valve Protection Device prior to each use to assure the following:

##### **7.1.3.1 NCI PF-21-1 Overpack**

- (a) The overpack base and supports are sound with no broken welds or components.
- (b) The overpack inner and outer shells are intact with no broken welds and no holes, tears, or deformations greater than one half of an inch (1/2"). Visual indications of corrosion or oxidation causing a through wall pitting in two (2) or more locations within a six by six inch (6" x 6") area shall be cause for rejection of the Overpack.
- (c) The inner liner is free of debris and standing water.
- (d) The inner liner is intact and is not in a deteriorated or damaged condition.
- (e) The gaskets and cylinder support pads are in place and intact and are not in a deteriorated or damaged condition.
- (f) The gasket surfaces are free from nicks and deep scratches.
- (g) The cover plates and welds are sound and undamaged.

- (h) The Overpack halves fit together properly with no gaps.
- (i) The closure mechanisms are in operational condition and are not in a deteriorated or damaged condition.
- (j) All vent seals/plugs are securely in place.
- (k) The tie-down and lifting/stacking supports are in place and are not in a deteriorated or damaged condition.
- (l) The shackles are in place and are not in a deteriorated or damaged condition.
- (m) The security seal apparatus is undamaged.

Following the inspection, a report shall be completed verifying that the NCI 21-PF-1 Overpack is free from damage and is in working order. Any defective condition must be corrected and the NCI 21-PF-1 Overpack must be re-certified prior to use.

#### **7.1.3.2 Valve Protection Device**

- (a) Verify that the spider is sound with no broken welds.
- (b) Verify that the spider clamps operated properly and verify that the bolts located on the tips are locked in place.
- (c) Verify that the neoprene bolt protectors are in place and not deteriorated (replace if damaged).

#### **7.1.4 Procedure for Loading the 30B Cylinder**

- 7.1.4.1 Prior to loading the cylinder, the inspections required in Section 7.1.2 and 7.1.3 shall be completed and documented.
- 7.1.4.2 The 30B UF<sub>6</sub> cylinder is filled, tested and handled in accordance with standard, in-plant operating procedures at the facility. As a minimum, the procedures described in USEC-651, or other equivalent in-plant procedure and ANSI Standard N14.1 shall be used.
- 7.1.4.3 Leak tightness of the filled cylinder shall have been previously verified using a test having a sensitivity of at least  $1 \times 10^{-3}$  std-cc/sec, or a regulatory-approved alternative having an equivalent sensitivity, consistent with ANSI N14.5-1997.
- 7.1.4.4 The cylinder shall be weighed using the procedures and standards outlined in USEC-651, or other equivalent in plant operating procedures, to assure that the capacity of the cylinder has not been exceeded.
- 7.1.4.5 The outer surface of the cylinder shall be approximately ambient temperature and the vapor pressure of the cylinder shall be below atmospheric pressure prior to loading into the overpack.

- 7.1.4.6 Prior to loading into the NCI 21-PF-1 Overpack, the valve port and valve boss/coupling shall be inspected for solid deposits. Solid deposits around the valve port or valve boss/coupling indicate a leak condition, and the cylinder shall not be loaded into the overpack. Corrective measure shall be taken to remedy the leak as proscribed by the facility's operating procedures. If the valve port and valve boss/coupling are free of solid deposits, the cylinder may be loaded into the NCI 21-PF-1 Overpack.
- 7.1.4.7 A tamper-indicating seal shall be installed on the 30B cylinder prior to loading it into the NCI 21-PF-1 Overpack.

### **7.1.5 Procedure for Loading the NCI 21-PF-1 Overpack**

- 7.1.5.1 The inspection required by Section 7.1.2, 7.1.3, and 7.1.4 shall be performed and documented prior to loading the NCI 21-PF-1 Overpack with a 30B cylinder.
- 7.1.5.2 Remove the temporary valve protection cover, if present.
- 7.1.5.3 The cylinder (horizontal) shall be oriented with the valve approximately in the twelve o'clock position.
- 7.1.5.4 One secondary aluminum insert shall be placed into the cylinder skirt.
- 7.1.5.5 The next secondary aluminum insert shall be placed into the cylinder skirt.
- 7.1.5.6 Once the two secondary aluminum inserts have been placed into the cylinder skirt, a two to three inch space should exist between the two pieces. A steel spacer shall be placed between the two aluminum inserts (see Appendix 1.3 for illustration).
- 7.1.5.7 The primary aluminum insert shall be placed over the valve.
- 7.1.5.8 Install the metal spider of the valve protection device among the inserts. Verify that the bridge of the valve location insert covers the cylinder valve.
- 7.1.5.9 Clamp the metal spider of the valve protection device in place (see Appendix 1.3 for illustration).
- 7.1.5.10 Carefully load the 30B cylinder into the bottom half of the NCI 21-PF-1 Overpack with the cylinder valve positioned up (at the twelve o'clock position).
- 7.1.5.11 Carefully place the lid on the NCI 21-PF-1 Overpack.
- 7.1.5.12 Fasten all closure mechanisms, alternating first corner-to-corner (4 closures) followed by side-to-side (6 closures).

- 7.1.5.13 Install security seals and record their numbers.
- 7.1.5.14 Complete radiation survey and assign Transport Index per applicable regulations.
- 7.1.5.15 Remove or obliterate old labels and re-label per applicable regulations.

## **7.2 Procedures for Unloading Package**

### **7.2.1 Procedure for Unloading the NCI 21-PF-1 Overpack.**

- 7.2.1.1 Inspect the exterior of the overpack as possible for damage using the steps provided in Section 7.1.3.1 (a), (b), (g), (h), (l), (j), (k), (l), and (m). Document any damage observed. Complete receiving report as required by facility operating procedures.
- 7.2.1.2 Remove and record the NCI 21-PF-1 overpack security seal
- 7.2.1.3 Loosen all closure mechanisms.
- 7.2.1.4 Remove the lid of the overpack.
- 7.2.1.5 Remove the 30B cylinder from the overpack.
- 7.2.1.6 Verify that the 30B security seal is intact. Remove and record the seal if required by in-plant operating procedures.
- 7.2.1.7 Remove the Valve protection Device from the 30B cylinder if required by in-plant operating procedures.
- 7.2.1.8 Clean any loose Debris from the NCI 21-PF-1 Overpack interior.
- 7.2.1.9 Close the NCI 21-PF-1 Overpack prior to storage

### **7.2.2 Procedure for Unloading the 30B cylinder.**

- 7.2.2.1 Prior to unloading the cylinder, cylinder shall be inspected and weighed as required by USEC-651 or equivalent in-plant operating procedures.
- 7.2.2.2 The 30B UF<sub>6</sub> cylinder is emptied and handled in accordance with standard, in-plant, operating procedures at the facility. As a minimum, the procedures described in USEC-651 or equivalent in-plant operating procedures, and ANSI Standard N14.1 shall be used.

### **7.3 Preparation of Empty Package for Transport**

Empty cylinders may be shipped without protective overpacks provided the residual heel does not exceed 25 lbs of UF<sub>6</sub> and 5% maximum <sup>235</sup>U enrichment and as required by the applicable regulations.

#### **7.3.1 Preparation of an empty overpack for shipment:**

7.3.3.1 Close the NCI 21-PF-1 Overpack.

7.3.3.2 Complete radiation survey.

7.3.3.3 Remove or obliterate old labels and re-label per applicable regulations

**SECTION EIGHT ACCEPTANCE TESTS AND MAINTENANCE PROGRAM**

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## **8. ACCEPTANCE TESTS AND MAINTENANCE PROGRAMS**

This section describes the activities to be performed in compliance with Subpart G of 10CFR71 to assure that the NCI 21-PF-1 package conforms to the requirements of this Safety Analysis Report and remains in conformance following loading.

### **8.1 Acceptance Tests**

#### **8.1.1 Acceptance Tests for the 30B Cylinder**

Acceptance tests for the 30B cylinder shall be in accordance with ANSI N14.1 (appropriate edition). Additionally, the cylinder shall be demonstrated to be capable of maintaining a leak tight condition using a test having a sensitivity of at least  $5.0 \times 10^{-8}$  std-cc/sec per ASNI N14.5-1997.

#### **8.1.2 Acceptance Tests for the NCI 21-PF-1 Overpack and Valve Protection Device**

##### **8.1.2.1 Acceptance Tests for the NCI 21-PF-1 Overpack**

Each completed overpack shall be inspected to document compliance with the following drawing requirements:

- (a) Final dimensions as described below:
  - Inner cylinder cavity dimensions.
  - Outer shell dimensions.
  - Closure mechanism locations.
  - Bolt center locations and hole diameters in tie down supports.
  - Flatness of gasket surface.
- (b) Installation of gaskets and cylinder support pads.
- (c) Lid to body fit.
- (d) Closure mechanism in proper configuration.
- (e) Installation of lifting shackles and security seal pads.
- (f) Actual weights of top and bottom halves.
- (g) Final assembled weights.
- (h) Proper permanent marking and nameplates per 10CFR71.85(c), 49CFR172, and ANSI N14.1, appropriate edition.

### **8.1.2.2 Acceptance Tests for the Valve Protection Device**

Each completed valve protection device shall be inspected to document compliance with the following drawing requirements:

- (a) As-built dimensions.
- (b) Clamp adjustments.
- (c) Actual weights of steel spider, steel space, primary insert and each secondary insert.
- (d) Final weight of entire valve protection device.
- (e) Proper permanent marking of each component per drawing VPD-0002.

### **8.1.2.3 Valve Protection Device Fit-Up Test**

Prior to the first use of each cylinder/valve combination with a valve protection device, a fit-up test will be performed to verify that the valve protection device fits properly. This fit-up test will verify the clearances in two locations:

- (1) The clearance between the valve and the underside of the bridge (g); and
- (2) The clearance between the underside of the valve protection device and the cylinder head (Gap).

The (g - Gap) value as specified on Figure 2.7-8 shall be at least 3/16" (5 mm). "g" and "Gap" measurements shall be measured using calibrated equipment with an accuracy of at least  $\pm 0.005$  inch.

The acceptance test will consist of the following steps:

- (a) The cylinder (horizontal) shall be oriented with the valve in approximately the twelve o'clock position.
- (b) One secondary aluminum insert shall be placed into the cylinder skirt.
- (c) The next secondary aluminum insert shall be placed into the cylinder skirt.
- (d) Once the two pieces have been placed inside of the cylinder skirt, a two to three inch space should exist between the two pieces.
- (e) The gauge insert (see Appendix 1.3 for drawing) shall be placed over the valve. A steel spacer shall be placed between the three pieces.

- (f) Install the metal spacer of the valve protection device among the inserts. Verify that the bridge of the gauge insert covers the cylinder valve and is centered on the centerline of the valve.
- (g) Clamp the metal spider of the valve protection device in place.
- (h) Measure "g."
- (i) Measure "Gap."
- (j) Calculate (g - Gap).
- (k) If (g - Gap) is greater than or equal to 3/16" (5 mm), then the cylinder/valve with the valve protection device are certified for use in the NCI 21-PF-1 Overpack.
- (l) If (g - Gap) is less than 3/16" (5 mm), then the cylinder/valve with the valve protection device may not be shipped in the NCI 21-PF-1 Overpack.
- (m) Once complete, unclamp the metal spider of the valve protection device.
- (n) Remove the metal spider from among the inserts.
- (o) Carefully remove the gauge insert from the cylinder skirt.
- (p) Remove the secondary location inserts from the cylinder skirt.

## **8.2 Maintenance Programs**

### **8.2.1 Maintenance Programs for the NCI 21-PF-1 Overpack and Valve Protection Device**

The user shall establish and implement written procedures for the periodic maintenance and inspection of each Model NCI 21-PF-1 overpack, requiring the following as a minimum:

#### **8.2.1.1 Annually**

- (a) Individually weigh each half (lid and bottom) of each packaging to verify that neither half has gained more than 25 pounds. Weight gain must be assumed to be water. If either half exhibits a gain of more than 25 pounds, the packaging must be removed from service and dried to within 10 pounds of its original nameplate weight. New weights of each packaging half must be established after any modifications, refurbishment, or repainting.

- (b) Check that the lifting shackles, closure mechanism and supports, and tie-down supports are sound and free from unacceptable discontinuities, damage and deterioration. Procedures for checking torque on the closure shall be:
  - 1. Loosen the set screw in collar bolts.
  - 2. Adjust the toggle closures to securely close overpack.
  - 3. Engage the toggle clamps and close toggles, alternating first corner-to-corner, followed by side-to-side.
  - 4. Torque to  $110 \pm 10$  ft-lb.
  - 5. Tighten the set screws.
- (b) Check that all vent caps are properly sealed.
- (c) Check that the inner and outer shells are free of unacceptable discontinuities, and the inner shells are free of debris and standing water. Through wall corrosion or oxidation occurring in two or more locations on the inner or outer shells within a six inch by six inch (6" x 6") area is cause for removal from service, followed by remedial working repair and surface preparation.
- (d) Check that the cover plates are sound and undamaged, and gasket sealing surfaces meet drawing requirements.
- (e) Replace all gaskets and pads.

#### **8.2.1.2 Every Five Years**

##### **8.2.1.2.1 NCI 21-PF-1 Overpack**

The owners are responsible for re-certifying the NCI 21-PF-1 overpack every five years to meet the original design specifications. The following inspections shall be performed:

- (a) Perform all routine inspections stated in Section 7 and annual inspections stated in Section 8.2.1.1.
- (b) Perform a full visual inspection of all welds for the presence of discontinuities. Any questionable condition of a weld shall be subject to further examination to assure that no unacceptable discontinuities are present. Weld defects shall be repaired prior to entering service.
- (c) Check the base and lid for warpage and/or distortion that may prevent tight closure. Check that the gasket sealing surfaces meet design specifications.
- (d) Verify that inner and outer shells are free of corrosion, pitting, unacceptable discontinuities, broken welds and pinholes. The overpack

shall receive a full visual inspection for the presence of corrosion. This inspection shall include assurance that corrosion has not reduced the skin wall thickness by 10% of the original nominal thickness in any six inch by six inch (6" x 6") area of the NCI 21-PF-1 Overpack. In the event that the visual inspection cannot assure sufficient minimum wall thickness, other non-destructive evaluation techniques, such as ultrasonic testing or equivalent, shall be utilized.

- (e) Assure that security seal holes are functional and capable of maintaining their integrity when seals are used.
- (f) The NCI 21-PF-1 Overpack foam shall be inspected to insure the presence and rigidity of foam. Each vent hole will be inspected with a probe (a blunt wooden or metal dowel, with a diameter of 1/4") to detect voids in the foam. Voids greater than one half inch (1/2") in depth or one half inch (1/2") in diameter shall be cause for rejection of the NCI 21-PF-1 Overpack.

Voids may be repaired by injecting foam and caulking compound. The injected foam and caulking must completely fill the void volume.

In the event that inspection reveals multiple voids greater than one inch in depth and greater than one inch in diameter, the NCI 21-PF-1 Overpack must be withdrawn from service for repair. If the void(s) cannot be filled, the overpack shall be removed from service.

- (g) All repairs shall be performed by competent sources. All repairs that require welding shall be made by welders who are qualified in accordance with Section IX of the ANSI/ASME Boiler and Pressure Vessel Code or Section 5 of ANSI/AWS D1.1. The repair shop shall provide certification of weld procedures and welder qualifications.
- (h) Permanently mark the exterior nameplate listing the date of re-certification, the individual base and lid weights, and the name of the re-certifying company

#### **8.2.1.2.2 Valve Protection Device**

In addition to routine operational inspections, the valve protection device shall be inspected every five years to verify compliance with original design criteria. As a minimum, this maintenance and inspection shall include:

- (a) All routine valve protection device inspections outlined in Section 7.
- (b) A full visual inspection of all valve protection device welds for the presence of cracks. Any questionable condition of a weld shall be subject

to further examination to assure that no cracks are present. Weld defects shall be repaired.

- (c) All repairs shall be performed by competent sources. All repairs that require welding shall be made by welders who are qualified in accordance with Section IX of the ANSI/ASME Boiler and Pressure Vessel Code or Section 5 of ANSI/AWS D1.1. The repair shop shall provide certification of weld procedures and welder qualifications.
- (d) A full visual inspection of painted valve protection device surfaces; any discontinuity in the paint coverage shall be corrected.

### **8.2.2 Maintenance Program for the 30B Cylinder**

Maintenance of the 30B Cylinders shall be performed in accordance with ANSI N14.1.